

WATER-RELATED SMALL RENEWABLE ENERGY PROJECTS

Compilation of Research & Input from Experts
For Consideration by DEQ's Water Related Regulatory Advisory Panel (RAP)
(Updated October 20, 2011)

FALLING WATER (HYDRO-ELECTRIC POWER)

Ann Miles, Federal Energy Regulatory Commission (FERC)

Ann Miles of FERC and Carol Wampler of DEQ discussed FERC's authorities in telephone discussions on September 6 and 7, 2011. Ms. Wampler emailed the following summary of their conversation to Ms. Miles on September 15 and asked Ms. Miles to confirm or correct the information:

1. Virginia is pre-empted from developing a permit for hydroelectric projects under the 2009 state statute. The Virginia statute directs DEQ to develop a permit that primarily addresses wildlife and historic-resources issues, if DEQ determines that a permit is necessary. For hydroelectric projects under FERC's jurisdiction, these issues are already fully addressed, so a Virginia permit is not necessary on substantive grounds. As a matter of law, however, Virginia cannot develop such a permit, as articulated by the U.S. Supreme Court in *First Iowa Hydro-Elec. Co-op. v. Federal Power Commission* and reiterated by attorneys at your agency. DEQ had reached a similar conclusion based on legal research done this summer, including the *First Iowa* case.
2. As far as you and we now know, it is unlikely that there will be a hydroelectric project in Virginia that would not come under FERC's jurisdiction, especially not a project large enough to exceed DEQ's 5 MW "de minimis" regulatory standard. This conclusion is consistent with the views of hydro developers whom we consulted.
3. The 2009 state statute also directs DEQ to develop a permit for projects generating electricity from tides or wave motion, if DEQ determines that such a permit is necessary. You indicated that your agency does not foresee that such projects will be developed in Virginia for the next four years (which is the interval at which DEQ re-examines all regulations), so a permit does not appear necessary at the present time. This conclusion is consistent with the views of all the other academicians and other expert resources we consulted.
4. The 2009 state statute also addresses permits for geothermal projects; however, FERC does not address such projects.

Ms. Miles emailed the following confirmation to Carol Wampler on September 16, 2011:

Carol – I confirm this information. You have done a good job writing it up. As to geothermal, I want to make it clear that neither the Federal Power Act nor any other law gives the Commission jurisdiction to site the construction and operation of geothermal projects. Best - Ann

Connor Kain Research Memo

*Connor Kain is a law student who interned at DEQ during the summer of 2011. Connor researched the four water-related energy sources named in the 2009 Small Renewable Energy Projects statute and summarized his findings in a memorandum to Carol Wampler dated July 13, 2011. Connor's research findings are consistent with the recommendations of Ms. Miles and the other experts consulted by DEQ whose comments are included in this document (below). Connor's memorandum is provided to the Water-Related RAP as a separate hand-out, as are copies of the U. S. Supreme Court's opinion in the *First Iowa Hydro-Electric* case.*

WAVE MOTION

Larry Atkinson, Professor Emeritus of Oceanography, former director of the Center for Coastal Physical Oceanography, Old Dominion University

Excerpt from an e-mail to Carol Wampler dated September 8, 2011:

"Most wave energy devices rely on long period ocean swell (not wind waves). The Bay and adjacent ocean (and the whole east coast) has a very low energy wave energy environment. George Hagerman (VT) is right now I believe doing a summary of wave energy for the US coastal waters."

George Hagerman, Director of Research, Virginia Coastal Energy Research Consortium, Virginia Tech

Excerpt from an e-mail to Carol Wampler dated September 8, 2011:

"AT MOST there might be very small demonstrations of wave energy devices, but these are unlikely to exceed 500 kW, which is the largest wave energy device of the type that might be suitable off Virginia."

TIDES

Larry Atkinson, Professor Emeritus of Oceanography, former director of the Center for Coastal Physical Oceanography, Old Dominion University

Excerpt from an e-mail to Carol Wampler dated September 8, 2011:

"The area (in the bay and adjacent ocean) has low tidal ranges and thus low tidal currents. This is unlike places like the East River in NYC where tidal turbines were tested (unsuccessfully I understand) or down in Georgia coastal waters where there are very large tidal ranges and strong tidal currents in the inlets."

George Hagerman, Director of Research, Virginia Coastal Energy Research Consortium, Virginia Tech

Excerpt from an e-mail to Carol Wampler dated September 8, 2011:

"Ditto for tidal current power, where the only conceivably harvestable resource would be in the North Channel of the Chesapeake Bay Bridge Tunnel Crossing. Tidal current turbine designs are 2 MW or less."

Georgia Tech Center for GIS: Assessment of Energy Production Potential from Tidal Streams in the US (<http://www.tidalstreampower.gatech.edu/>)

Resource maps are available on the website above illustrating mean current speed, mean kinetic power density and water depth, which, when analyzed for Virginia's waters, indicate a lack of available natural resources for energy production from tidal streams.

GEOHERMAL POWER

Dr. John Costain, Professor Emeritus of Geophysics, Department of Geosciences at Virginia Tech:

Excerpt from an e-mail to Heather Mackey, dated September 8, 2011:

"I don't believe Virginia has the kind of geothermal resource that has the potential for electric power production. What we do have in abundance is the opportunity for promoting low-temperature ground source heat pumps for residential and business heating and cooling, but not for power production. What we do need is a requirement that anyone who installs a ground source heat pump be required to notify the proper regulatory agency, so we can keep track of how many installations there are in the state."

"We at Virginia Tech have determined the heat flow in Virginia (<http://rglsun1.geol.vt.edu/>) and have not found evidence for "elevated crustal temperatures". I am familiar with the claims for West Virginia. They are based on the assumption of the presence of abnormally high abundances of the heat-producing elements U and Th in the basement rocks. The isotopes of these radioactive elements heat up the rocks and do raise the temperatures in the overlying rocks. If the basement rocks in West Virginia do have such abnormally high concentrations then the temperatures will be higher. As far as I know it is assumed that the basement rocks there do have such concentrations, but I think it is an assumption not supported by data. Surely holes have been drilled to basement in West Virginia and the crystalline basement rocks sampled for the heat-producing elements. Until this is done I think it is pure speculation there and a waste of time and money in Virginia for DEQ to develop a permit by rule for the production of electricity from geothermal resources in Virginia."

Excerpt from an e-mail to Heather Mackey, dated September 9, 2001:

"Those basement rocks in West Virginia are key. You might contact the WV geological survey to see if they have analyzed any basement core for U, Th but they probably haven't. But could they? There was a paper given on the WV geothermal prospects at last year's meeting of the American Geophysical Union in San Francisco, but I thought the justification was weak and the higher hoped-for temperatures depended so much on heat production from the radioactive decay of U and Th. So far, the high temperatures are estimated from bottom-hole-temperatures estimated from oil and gas wells. Even the authors say "The individual BHTs and estimated thermal conductivity data have a relatively high uncertainty"."

(<http://smu.edu/smunews/geothermal/documents/west-virginia-temperatures.asp>).

"Furthermore, an earlier AAPG paper (attached below) does not support high geothermal gradients. The theoretical temperature-depth curves I saw at the meeting depended on heat production from those basement rocks."



WestVirginiaTempera
tures.pdf

George Hagerman, Director of Research, Virginia Coastal Energy Research Consortium, Virginia Tech

Excerpt from an e-mail to Carol Wampler dated September 8, 2011:

"While not an expert on geothermal technologies, I doubt that a demonstration project is likely within the next 2 to 4 years. If and when such demonstration projects are attempted, however, they could be larger than 5 MW in order to justify the high cost of drilling the geothermal wells."

Virginia Dept of Health (VDH) - Pending Regulations for Geothermal Well Permits

The VDH geo thermal well permit regulations (12 VAC 5-630-271) are currently in the Governor's office pending Executive Review. The express geothermal permit is required for construction of wells used solely for a closed-loop geothermal heating system.

Virginia Dept of Mines, Minerals and Energy (DMME) - Regulations for Industrial Geothermal Well Permits

The DMME regulations (4 VAC 25-170) for industrial geothermal well permits regulate the technical aspects of drilling wells for geothermal purposes, including resource protection, groundwater monitoring, safety, construction and maintenance.

U.S. Department of Energy National Renewable Energy Laboratory

Additional geothermal data and mapping resources are available at http://www.nrel.gov/geothermal/data_resources.html which, when analyzed, indicate a lack of adequate geothermal resources in Virginia for the generation of electricity.

Southern Methodist University, Huffington Department of Earth Sciences Research

Potential for Geothermal Power – Scientific Paper by D. Blackwell, Z. Frone, and M. Richards of the Huffington Dept of Earth Sciences, Geothermal Laboratory at Southern Methodist University, Dallas TX (abstract available at <http://smu.edu/smunews/geothermal/documents/west-virginia-temperatures.asp>)

Update: October 20, 2011

Email from RAP member Frank Simms to Carol Wampler, dated October 4, 2011:

“I had a discussion yesterday afternoon with Ann Miles of the FERC regarding FERC authority relative to hydrokinetic, wave, and tidal generation projects. According to Ms. Miles, the FERC has jurisdiction in all territorial seas since the FERC considers ocean and bay waters to be navigable. Therefore, the Chesapeake Bay would fall under FERC jurisdiction as would the three miles extending from the shoreline to the outer ocean. Any connection that provides power to the grid would also fall under the purview of the FERC, thus covering hydrokinetic projects including those having no associated dam.

She indicated that the FERC has an agreement with the former Minerals Management Service (MMS) regarding responsibilities within the outer ocean area. As noted in the attached News Release, the MMS has been divided into two independent bureaus, the Bureau of Safety and Environmental Enforcement (BSEE) and the Bureau of Ocean Energy Management (BOEM). I believe that the agreement between the FERC and MMS was discussed at our meeting on September 27.

Ms. Miles did inform me that the FERC and the State of Colorado have developed a MOU that allows the State of Colorado to handle the pre-filing process for hydroelectric facilities having a rated capacity of 5 MW or less. In addition, the MOU allows for more local control of those projects. I have attached a copy of the MOU which is also available on the FERC website.

If the Commonwealth of Virginia is interested in formulating such an MOU, Ms. Miles suggested that contact be made with Shana Murray of the FERC. Her phone number is [1-202-502-8333](tel:1-202-502-8333). Ms. Miles believes that the most potential for growth relative to hydroelectric facilities is for projects on existing dams having rated capacities of 5 MW or less.

In conclusion, it would appear that handling hydrokinetic, wave, and tidal generation projects relative to a PBR similar to the recommendation for hydroelectric facilities would be the appropriate course of action by the RAP.”



FERC - Colorado
MOU.pdf



MMS to BSEE.pdf

Two emails from RAP member John Evans to Carol Wampler, both dated September 28, 2011:

Email 1: "Good morning. Thank you again for putting together the RAP panel and yesterday's meeting. I have asked our New York District office about their participation in the permitting process for the East River "hydrokinetic" project. While they have not yet replied, I have already learned a lot more.

I have attached a 231 page Volume 1 of 4, FERC application for "Roosevelt Island Tidal Energy Project" or RITE (*noted attachment is available at <http://www.theriteproject.com/Documents.html>*). After just a brief, preliminary review, it appears that FERC did not choose to license the early demonstration project, but the Corps did permit in some manner. After yesterday's FERC discussion, it appears that as FERC will make a license decision on the pilot project, that the Corps may not need or to issue a Section 10 permit. Corps guidance is that where FERC activities affect navigation they must be approved by the Corps; but that interests of navigation are generally protected by Corps recommendations to FERC to include in the FERC license rather than separate Corps permit."

Email 2: "The initial demo project used six turbines with a potential of 1,000 daily kilowatt hours of power from only five of the units, or 200KW hours per turbine. The power turbines are rated at 35-kilowatts.

Here is one more item related to FERC and hydrokinetic projects. You may want legal staff to review the MOU as it seems to place wave and tide projects in the same class as falling water. If that is true, the RAP may want include a statement to the effect of, "Whereas FERC is taking the lead for license decisions regarding hydrokinetic projects that, in addition to hydropower or falling water, include wave motion and tides; that Virginia is likely to be pre-empted from developing a permit for any hydrokinetic projects under the 2009 state statute. We therefore recommend that DEQ not develop a PBR at this time, in view of the lack of sufficient hydrokinetic resources, a lack of generation technology, and the likely preemption by FERC for license decisions."



mms-doi.pdf